CERTIFICATE

By Authority Of
THE UNITED STATES OF AMERICA
Legally Binding Document

By the Authority Vested By Part 5 of the United States Code § 552(a) and Part 1 of the Code of Regulations § 51 the attached document has been duly INCORPORATED BY REFERENCE and shall be considered legally binding upon all citizens and residents of the United States of America. ***HEED THIS NOTICE***: Criminal penalties may apply for noncompliance.

This Document Posted By Public.Resource.Org, Inc., a California Nonprofit Organization.

Not Affiliated Or Authorized by ASTM or by the United States Government

Document Name: ASTM A501: Hot-Formed Welded and Seamless Carbon Steel Structural Tubing

CFR Section(s): 24 CFR 200, Subpart S

Standards Body: American Society for Testing and Materials

Official Incorporator:

THE EXECUTIVE DIRECTOR
OFFICE OF THE FEDERAL REGISTER
WASHINGTON, D.C.

AMERICAN NATIONAL STANDARD ANSI/ASTM A 501 - 76

Standard Specification for
HOT-FORMED WELDED AND SEAMLESS CARBON STEEL STRUCTURAL TUBING[1]

This Standard is issued under the fixed designation A 501; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

1. Scope

1.1 This specification covers hot-formed welded and seamless carbon steel square, round, rectangular, or special shape structural tubing for welded, riveted, or bolted construction of bridges and buildings, and for general structural purposes.

1.2 Square and rectangular tubing is furnished in sizes 1 to 10 in. (25.4 to 254 mm) across flat sides with wall thicknesses 0.095 to 1.000 in. (2.41 to 25.40 mm), depending on size; round tubing is furnished in nominal diameters ½ to 24 in. (12.7 to 610 mm), incl, with nominal (average) wall thicknesses 0.109 to 1.000 in. (2.77 to 25.40 mm), depending on size. Tubing having other dimensions may be furnished provided such tubing complies with all other requirements of this specification.

1.3 Tubing may be furnished with hot-dipped galvanized coating.

NOTE—The values stated in U.S. customary units are to be regarded as the standard.

2. Ordering Information

2.1 Orders for material under this specification shall include the following, as required, to describe the desired material adequately.

2.1.1 Quantity (feet or number of lengths),

2.1.2 Name of material (hot-formed tubing),

2.1.3 Method of manufacture (seamless or butt welded),

2.1.4 When galvanized coating required (see 14.1),

2.1.5 Size (Section 12),

2.1.6 Length (specific or random, see 13.3),

2.1.7 End condition (see 17.3),

2.1.8 Burr removal (see 17.3),

2.1.9 Certification (see 17.4),

2.1.10 ASTM specification number,

2.1.11 End use, and

2.1.12 Special requirements.

3. Process

3.1 The steel shall be made by one or more of the following processes: open-hearth, basic-oxygen, or electric-furnace.

4. Manufacture

4.1 The tubing shall be made by the seamless or furnace butt welding process (continuous welded) except that tubing made by the electric-resistance-welding process and subsequently reheated throughout its cross section and hot formed by a reducing or shaping process, or both, is also an acceptable process of manufacture.

5. Heat Analysis

5.1 An analysis of each heat of open-hearth, basic-oxygen, or electric-furnace steel shall be made by the manufacturer. This analysis shall be made from a test ingot taken during the pouring of the heat. The chemical composition thus determined shall conform to the requirements specified in Table 1 for heat analysis.

6. Product Analysis

6.1 An analysis may be made by the purchaser from finished tubing manufactured in accordance with this specification, or an analysis may be made from flat-rolled stock from which the welded tubing is manufactured.

---

[1] This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys, and is the direct responsibility of Subcommittee A01.09 on Pipe.

Current edition approved July 30, 1976. Published September 1976. Originally published as A 501 - 64. Last previous edition A 501 - 74.

When product analyses are made, two sample lengths from a lot of each 500 lengths or fraction thereof shall be selected. The specimens for chemical analysis shall be taken from the sample lengths in accordance with the applicable procedures of ASTM Method E 59, Sampling Steel and Iron for Determination of Chemical Composition.[2] The chemical composition thus determined shall conform to the requirements specified in Table 1 for product analysis.

6.2 In the event the chemical composition of one of the sample lengths does not conform to the requirements shown in Table 1 for product analysis, an analysis of two additional lengths selected from the same lot shall be made, each of which shall conform to the requirements shown in Table 1 for product analysis, or the lot is subject to rejection.

7. Tensile Requirements

7.1 The material, as represented by the test specimen, shall conform to the requirements as to tensile properties prescribed in Table 2.

8. Bend Test

8.1 The bend test shall be made on square or rectangular tubing manufactured in accordance with this specification.

8.2 The bend test specimen shall be taken longitudinally from the tubing, and shall represent the full wall thickness of material. The sides of the bend test specimen may have the corners rounded to a maximum radius of $\frac{1}{16}$ in. (1.6 mm).

8.3 The bend test specimen shall stand being bent cold through 180 deg, without cracking on the outside of the bent portion, to an inside diameter which shall have a relation to the thickness of the specimen as prescribed in Table 3.

9. Test Method

9.1 The test specimens required by this specification shall conform to those described in the latest issue of ASTM Methods and Definitions, A 370, for Mechanical Testing of Steel Products.[3]

9.2 The tension test specimen shall be taken longitudinally from a section of the finished tubing, at a location at least 90 deg from the weld in the case of welded tubing, and shall not be flattened between gage marks. If desired, the tension test may be made on the full section of the tubing; otherwise, a longitudinal strip-test specimen shall be used as prescribed in Methods A 370 Supplement II. The specimens shall have all burrs removed and shall not contain surface imperfections which would interfere with proper determination of the tensile properties of the metal.

9.3 The yield point shall be determined in accordance with one of the alternatives described in Methods A 370.

10. Number of Tests

10.1 One tension and one bend test, as specified in Sections 7 and 8 shall be made from tubing representing each heat.

11. Retests

11.1 If the results of the mechanical tests representing any heat do not conform to a requirement, as specified in Sections 7 and 8, retests may be made on additional tubing of double the original number from the same heat, each of which shall conform to the requirement specified, or the tubing represented by the test is subject to rejection.

11.2 In case of failure on retest to meet the requirements of Sections 7 and 8, the manufacturer may elect to retreat, rework, or otherwise eliminate the condition responsible for failure to meet the specified requirements. Thereafter, the material remaining from the respective heat originally represented may be tested, and shall comply with all requirements of this specification.

12. Dimensions

12.1 *Square Structural Tubing*—The outside dimensions (across the flats), the weight per foot, and the calculated nominal wall thickness of common sizes of square structural tubing included in this specification are listed in Table 4.

12.2 *Rectangular Structural Tubing*—The outside dimensions (across the flats), the weight per foot, and the calculated nominal wall thickness of common sizes of rectangular structural tubing included in this specification are listed in Table 5.

---

[2] *Annual Book of ASTM Standards*, Part 12.

[3] *Annual Book of ASTM Standards*, Parts 1, 2, 3, 4, and 5, and 10.

12.3 *Round Structural Tubing*—The nominal size and outside diameter dimensions, the weight per foot, and the calculated nominal wall thickness of common sizes of round structural tubing included in this specification are listed in Table 6.

12.4 *Special Shape Structural Tubing*—The dimensions and tolerances of special shape structural tubing are available by inquiry and negotiation with the manufacturer.

12.5 *Other Sizes*—Hot-formed welded and seamless structural tubing may be manufactured in accordance with the requirements of this specification to other ordered dimensions not listed in Tables 4, 5, and 6. In this event, the dimensional tolerances shall be consistent with those shown in this specification for similar sizes and type of product.

13. Permissible Variations in Dimensions of Square, Round, Rectangular and Special Shape Structural Tubing

13.1 *Outside Dimensions*—The specified dimensions, measured across the flats at positions at least 2 in. (50.8 mm) from either end of square or rectangular tubing and including an allowance for convexity or concavity, shall not exceed the plus and minus tolerance shown in Table 7. For round hot-formed structural tubing 2 in. and over in nominal size, the outside diameter shall not vary more than ±1 percent from the standard specified. For nominal sizes 1½ in. (38.1 mm) and under the outside diameter shall not vary more than $\frac{1}{64}$ in. (0.40 mm) over nor more than $\frac{1}{32}$ in. (0.79 mm) under the standard specified.

13.2 *Weight*—The weight of the structural tubing, as specified in Tables 4, 5, and 6, shall not be less than the specified value by more than 3.5 percent.

13.3 *Length*—Structural tubing is commonly produced in random mill lengths of 16 to 22 ft (4.9 to 6.7 m) or 32 to 44 ft (6.7 to 9.8 m) in multiple lengths, and in definite cut lengths. Refer to Section 2. When cut lengths are specified for structural tubing, the length tolerances shall be in accordance with Table 8.

13.4 *Straightness*—The permissible variation for straightness of structural tubing shall be ⅛ in. times the number of feet (10.4 mm times the number of meters) of total length divided by 5.

13.5 *Squareness of Sides*—For square or rectangular structural tubing, adjacent sides may deviate from 90 deg by a tolerance of plus or minus 2 deg max.

13.6 *Radius of Corners*—For square or rectangular structural tubing, the radius of any outside corner of the section shall not exceed three times the specified wall thickness.

13.7 *Twist*—The tolerances for twist or variation with respect to axial alignment of the section, for square and rectangular structural tubing, shall be as shown in Table 9. Twist is measured either by holding down one end of a square or rectangular tube on a flat surface plate with the bottom side of the tube parallel to the surface plate and noting the height that either corner, at the opposite end of the bottom side of the tube, extends above the surface plate, or by use of a suitable measuring device for heavier sections. The difference in the height of the corners shall not exceed the values in Table 9. Twist measurements are not to be taken within 2 in. (50 mm) of either end of the product.

14. Galvanized Coatings

14.1 For structural tubing requiring galvanized coating, such coating shall comply with the requirements contained in the latest revision of ASTM Specification A 120, Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses,[4] with the additional provision that, at the option of the manufacturer, the weight of coating may also be determined from the weight of zinc on the outside surface only.

15. Marking

15.1 Except as noted in 15.2, each length of structural tubing shall be legibly marked by rolling, die-stamping, ink printing, or paint stenciling to show the following information: manufacturer's name, brand, or trademark; size and thickness; and the specification number.

---

[4] *Annual Book of ASTM Standards*, Part 1.

15.2 For structural tubing having the greatest cross sectional dimension less than 2 in. (50.8 mm), the information listed in 15.1 may be marked on a tag securely attached to each bundle.

16. Packaging, Marking, and Loading

16.1 When specified in the order, contract, etc. packaging, marking, and loading shall be in accordance with those procedures recommended by ASTM Recommended Practice A 700, for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment.[5]

17. Inspection

17.1 All tubing shall be subject to an inspection at the place of manufacture to assure conformance with the requirements of this specification.

17.2 The structural tubing shall be free from injurious defects and shall have a commercially smooth finish.

17.2.1 Surface imperfections shall be classed as injurious defects when their depth exceeds 15 percent of the wall thickness as stated in Tables 4, 5, or 6 and when the imperfections materially affect the appearance of the structural member, or when their length (measured in a transverse direction) and depth would materially reduce the total cross sectional area at any location.

17.2.2 Injurious defects having a depth not in excess of 33⅓ percent of the wall thickness stated in Tables 4, 5, or 6 may be repaired by welding, subject to the following conditions:

17.2.2.1 The defect shall be completely removed by chipping or grinding to sound metal.

17.2.2.2 The repair weld shall be made using suitable coated electrodes.

17.2.2.3 The projecting weld metal shall be removed to produce a workmanlike finish.

17.3 The ends of structural tubing, unless otherwise specified, shall be finished square cut, and the burr held to a minimum. The burr can be removed on the outside diameter, inside diameter, or both, as a supplementary requirement. When burrs are to be removed, it shall be specified in the purchase order.

17.4 Upon request of the purchaser in the contract or order, a manufacturer's certification that the material was manufactured and tested in accordance with this specification together with a report of the chemical and tensile tests shall be furnished.

18. Rejection

18.1 Each length of tubing received from the manufacturer may be inspected by the purchaser and, if it does not meet the requirements of this specification based on the inspection and test method as outlined in the specification, the length may be rejected and the manufacturer shall be notified. Disposition of rejected tubing shall be a matter of agreement between the manufacturer and the purchaser.

18.2 Tubing found in fabrication or in installation to be unsuitable for the intended use, under the scope and requirements of this specification, may be set aside and the manufacturer notified. Such tubing shall be subject to mutual investigation as to the nature and severity of the deficiency and the forming or installation, or both, conditions involved. Disposition shall be a matter for agreement.

---

[5] *Annual Book of ASTM Standards*, Parts 1, 3, 4, and 5.

TABLE 1 Chemical Requirements

Element	Composition, percent	
	Heat analysis	Product analysis
Carbon, max	0.26	0.30
Phosphorus, max	0.04	0.05
Sulfur, max	0.05	0.063
Copper, when copper steel is specified, min	0.20	0.18

TABLE 2 Tensile Requirements

Tensile strength, min, psi (MPa)	58 000 (400)
Yield point, min, psi (MPa)	36 000 (248)
Elongation in 2 in. (50.8 mm) min, percent[a]	23
Elongation in 8 in. (203 mm) min, percent[a]	20[b]

[a] Elongation may be determined in a gage length of either 2 in. or 8 in. at the manufacturer's option.

[b] For material under 5/16 in. in thickness, a deduction from the percentage elongation of 1.25 percent in 8 in. specified in Table 2 shall be made for each decrease of 1/32 in. of the specified thickness under 5/16 in.

TABLE 3 Bend Test Requirements

Thickness of Material, in. (mm)	Ratio of Bend Diameter to Specimen Thickness
¾ in. (19.0) and under	½
Over ¾ in. to 1 in. (19.0 to 25.4), incl	1

TABLE 4 Dimensions of Common Sizes of Square Structural Tubing

Size Given in Outside Dimensions Across Flat Sides, in. (mm)	Weight per Foot, lb (kg/m)	Calculated Nominal Wall Thickness, in. (mm)
1 by 1	1.09 (1.62)	0.095 (2.41)
(25.4 by 25.4)	1.41 (2.10)	0.133 (3.38)
2 by 2	2.69 (4.00)	0.110 (2.79)
(50.8 by 50.8)	3.04 (4.52)	0.125 (3.18)
	3.65 (5.44)	0.154 (3.91)
	4.31 (6.41)	0.188 (4.78)
2½ by 2½	4.32 (6.43)	0.141 (3.58)
(63.5 by 63.5)	5.59 (8.32)	0.188 (4.78)
	7.10 (10.56)	0.250 (6.35)
3 by 3	5.78 (8.60)	0.156 (3.96)
(76.2 by 76.2)	6.86 (10.21)	0.188 (4.78)
	8.80 (13.09)	0.250 (6.35)
3½ by 3½	6.88 (10.24)	0.156 (3.96)
(88.9 by 88.9)	8.14 (12.11)	0.188 (4.78)
	10.50 (15.62)	0.250 (6.35)
	12.69 (18.88)	0.312 (7.92)
4 by 4	9.31 (13.85)	0.188 (4.78)
(101.6 by 101.6)	12.02 (17.89)	0.250 (6.35)
	14.52 (21.61)	0.312 (7.92)
	16.84 (25.06)	0.375 (9.52)
	20.88 (31.07)	0.500 (12.70)
5 by 5	11.86 (17.65)	0.188 (4.78)
(127.0 by 127.0)	15.42 (22.94)	0.250 (6.35)
	18.77 (27.93)	0.312 (7.92)
	21.94 (32.65)	0.375 (9.52)
	27.68 (41.19)	0.500 (12.70)
6 by 6	14.41 (21.44)	0.188 (4.78)
(152.4 by 152.4)	18.82 (28.00)	0.250 (6.35)
	23.02 (34.25)	0.312 (7.92)
	27.04 (40.28)	0.375 (9.52)
	34.48 (51.31)	0.500 (12.70)
7 by 7	16.85 (25.07)	0.188 (4.78)
(177.8 by 177.8)	22.04 (32.80)	0.250 (6.35)
	26.99 (39.16)	0.312 (7.92)
	31.73 (47.21)	0.375 (9.52)
	40.55 (60.34)	0.500 (12.70)
8 by 8	25.44 (37.85)	0.250 (6.35)
(203.2 by 203.2)	31.24 (46.49)	0.312 (7.92)
	36.83 (54.80)	0.375 (9.52)
	47.35 (70.46)	0.500 (12.70)
	56.98 (84.79)	0.625 (15.88)
	65.73 (97.81)	0.750 (19.05)
10 by 10	32.23 (47.96)	0.250 (6.35)
(254.0 by 254.0)	39.74 (59.13)	0.312 (7.92)
	47.03 (69.98)	0.375 (9.52)
	60.95 (90.69)	0.500 (12.70)
	73.98 (110.08)	0.625 (15.88)
	86.13 (128.16)	0.750 (19.05)
	107.79 (160.39)	1.000 (25.40)

TABLE 5 Dimensions of Common Sizes of Rectangular Structural Tubing

Size Given in Outside Dimensions Across Flat Sides, in. (mm)	Weight per Foot, lb (kg/m)	Calculated Nominal Wall Thickness, in. (mm)
3 by 2 (76.2 by 50.8)	4.32 (6.43)	0.141 (3.58)
	5.59 (8.32)	0.188 (4.78)
	7.10 (10.56)	0.250 (6.35)
4 by 2 (101.6 by 50.8)	5.78 (8.60)	0.156 (3.96)
	6.86 (10.21)	0.188 (4.78)
	8.80 (13.09)	0.250 (6.35)
4 by 3 (101.6 by 76.2)	6.88 (10.24)	0.156 (3.96)
	8.14 (12.11)	0.188 (4.78)
	10.50 (15.62)	0.250 (6.35)
	12.69 (18.88)	0.312 (7.92)
5 by 3 (127.0 by 76.2)	9.31 (13.85)	0.188 (4.78)
	12.02 (17.89)	0.250 (6.35)
	14.52 (21.61)	0.312 (7.92)
	16.84 (25.06)	0.375 (9.52)
6 by 3 (152.4 by 76.2)	10.58 (15.74)	0.188 (4.78)
	13.72 (20.42)	0.250 (6.35)
	16.65 (24.78)	0.312 (7.92)
	19.39 (28.85)	0.375 (9.52)
6 by 4 (152.4 by 101.6)	11.86 (17.65)	0.188 (4.78)
	15.42 (22.94)	0.250 (6.35)
	18.77 (27.93)	0.312 (7.92)
	21.94 (32.65)	0.375 (9.52)
	27.68 (41.19)	0.500 (12.70)
7 by 5 (177.8 by 127.0)	14.41 (21.44)	0.188 (4.78)
	18.82 (28.00)	0.250 (6,35)
	23.02 (34.25)	0.312 (7.92)
	27.04 (40.28)	0.375 (9.52)
	34.48 (51.31)	0.500 (12.70)
8 by 4 (203.2 by 101.6)	14.41 (21.44)	0.188 (4.78)
	18.82 (28.00)	0.250 (6.35)
	23.02 (34.25)	0.312 (7.92)
	27.04 (40.28)	0.375 (9.52)
	34.48 (51.31)	0.500 (12.70)
8 by 6 (203.2 by 152.4)	16.85 (25.07)	0.188 (4.78)
	22.04 (32.80)	0.250 (6.35)
	26.99 (39.16)	0.312 (7.92)
	31.73 (47.21)	0.375 (9.52)
	40.55 (60.34)	0.500 (12.70)
10 by 6 (254.0 by 152.4)	25.44 (37.85)	0.250 (6.35)
	31.24 (46.49)	0.312 (7.92)
	36.83 (54.80)	0.375 (9.52)
	47.35 (70.46)	0.500 (12.70)

TABLE 6 Dimensions of Common Sizes of Round Structural Tubing

Nominal Size, in.	Outside Diameter, in. (mm)	Weight Per Foot, lb (kg/m)	Calculated Nominal Wall Thickness, in. (mm)
½	0.840 (21.3)	0.85 (1.26)	0.109 (2.77)
	0.840 (21.3)	1.09 (1.62)	0.147 (3.73)
¾	1.050 (26.7)	1.13 (1.68)	0.113 (2.87)
	1.050 (26.7)	1.47 (2.19)	0.154 (3.91)
1	1.315 (33.4)	1.34 (1.99)	0.104 (2.64)
	1.315 (33.4)	1.68 (2.50)	0.133 (3.38)
	1.315 (33.4)	2.17 (3.23)	0.179 (4.55)
1¼	1.660 (42.2)	1.81 (2.69)	0.110 (2.79)
	1.660 (42.2)	2.27 (3.38)	0.140 (3.56)
	1.660 (42.2)	3.00 (4.47)	0.191 (4.85)
1½	1.900 (48.3)	2.17 (3.23)	0.114 (2.90)
	1.900 (48.3)	2.72 (4.05)	0.145 (3.68)
	1.900 (48.3)	3.63 (5.41)	0.200 (5.08)
2	2.375 (60.3)	2.92 (4.34)	0.121 (3.07)
	2.375 (60.3)	3.65 (5.44)	0.154 (3.91)
	2.375 (60.3)	5.02 (7.48)	0.218 (5.54)
2½	2.875 (73.0)	4.53 (6.75)	0.156 (3.96)
	2.875 (73.0)	5.40 (8.04)	0.188 (4.78)
	2.875 (73.0)	5.79 (8.62)	0.203 (5.16)
	2.875 (73.0)	7.66 (11.41)	0.276 (7.01)
3	3.500 (88.9)	5.58 (8.30)	0.156 (3.96)
	3.500 (88.9)	6.63 (9.87)	0.188 (4.78)
	3.500 (88.9)	7.58 (11.29)	0.216 (5.49)
	3.500 (88.9)	10.25 (15.27)	0.300 (7.62)
3½	4.000 (101.6)	6.40 (9.53)	0.156 (3.96)
	4.000 (101.6)	7.63 (11.35)	0.188 (4.78)
	4.000 (101.6)	9.11 (13.57)	0.226 (5.74)
	4.000 (101.6)	12.51 (18.61)	0.318 (8.08)
4	4.500 (114.3)	7.25 (10.79)	0.156 (3.96)
	4.500 (114.3)	8.64 (12.86)	0.188 (4.78)
	4.500 (114.3)	10.00 (14.88)	0.219 (5.56)
	4.500 (114.3)	10.79 (16.06)	0.237 (6.02)
	4.500 (114.3)	14.98 (22.29)	0.337 (8.56)
5	5.563 (141.3)	14.62 (21.75)	0.258 (6.55)
	5.563 (141.3)	20.78 (30.92)	0.375 (9.53)
	5.563 (141.3)	38.55 (57.36)	0.750 (19.05)
6	6.625 (168.3)	18.97 (28.23)	0.280 (7.11)
	6.625 (168.3)	28.57 (42.51)	0.432 (10.97)
	6.625 (168.3)	53.16 (79.10)	0.864 (21.95)
8	8.625 (219.1)	28.55 (42.48)	0.322 (8.18)
	8.625 (219.1)	43.39 (64.56)	0.500 (12.70)
	8.625 (219.1)	72.42 (107.76)	0.875 (22.23)
10	10.750 (273.0)	40.48 (60.23)	0.365 (9.27)
	10.750 (273.0)	54.74 (81.45)	0.500 (12.70)
	10.750 (273.0)	104.13 (154.95)	1.000 (25.40)
12	12.750 (323.8)	49.56 (73.75)	0.375 (9.53)
	12.750 (323.8)	65.42 (97.34)	0.500 (12.70)
	12.750 (323.8)	125.49 (186.73)	1.000 (25.40)
14	14.000 (355.6)	54.57 (81.20)	0.375 (9.53)
	14.000 (355.6)	72.09 (107.27)	0.500 (12.70)
16	16.000 (406.4)	62.58 (93.12)	0.375 (9.53)
	16.000 (406.4)	82.77 (123.16)	0.500 (12.70)
18	18.000 (457.2)	70.59 (105.04)	0.375 (9.53)
	18.000 (457.2)	93.45 (139.05)	0.500 (12.70)
20	20.000 (508.0)	78.60 (116.96)	0.375 (9.53)
	20.000 (508.0)	104.13 (154.91)	0.500 (12.70)
24	24.000 (609.6)	94.02 (140.79)	0.375 (9.53)
	24.000 (609.6)	125.49 (186.73)	0.500 (12.70)

TABLE 7 Outside Dimension Tolerances for Square, Rectangular, and Special Shape Structural Tubing

Largest Outside Dimension, Across Flats, in. (mm)	Tolerance,[a] plus and minus, in. (mm)
2½ (63.5) and under	0.020 (0.51)
Over 2½ to 3½ (63.5 to 88.9), incl	0.025 (0.64)
Over 3½ to 5½ (88.9 to 139.7), incl	0.030 (0.76)
Over 5½ (139.7)	1 percent

[a] The respective outside dimension tolerances include the allowances for convexity and concavity.

TABLE 8 Cut Length Tolerances for Structural Tubing

	22 ft (6.7 m) and Under		Over 22 to 44 ft (6.7 to 13.4 m), incl	
	Over	Under	Over	Under
Length tolerance for specified cut lengths, in. (mm)	½ (12.7)	¼ (6.4)	¾ (19.0)	¼ (6.4)

TABLE 9 Twist Tolerances for Square, Rectangular, or Special Shape Structural Tubing

Specified Dimension of Longest Outer Side, in. (mm)	Maximum Twist in the First 3 ft (1 m) and in each additional 3 ft	
	in.	mm
1½ (38.1) and under	0.050	1.39
Over 1½ to 2½ (38.1 to 63.5), incl	0.062	1.72
Over 2½ and 4 (63.5 to 101.6), incl	0.075	2.09
Over 4 to 6 (101.6 to 152.4), incl	0.087	2.42
Over 6 to 8 (152.4 to 203.2), incl	0.100	2.78
Over 8 (203)	0.112	3.11

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, 1916 Race St., Philadelphia, Pa. 19103, which will schedule a further hearing regarding your comments. Failing satisfaction there, you may appeal to the ASTM Board of Directors.